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## City of St. Charles Certificate of Insurance Requirements

Contractors shall carry all insurance coverage required by law. In addition, the Contractor shall carry, at its own expense, at least the following insurance coverage with a duly licensed and registered insurance company in the State of Illinois having a minimum A.M. Best rating of A-VI:

- (a) Workers' Compensation & Occupational Diseases Insurance – Statutory amount for Illinois
- (b) General Liability Insurance:
  - 1) Bodily injury, with limits of not less than \$1,000,000 each occurrence/  
\$2,000,000 aggregate;
  - 2) Property damage, with limits of not less than \$1,000,000 each occurrence/  
\$2,000,000 aggregate;
  - 3) Contractual insurance – broad form, with limits of not less than \$1,000,000 each occurrence/\$2,000,000 aggregate.
- (c) Automotive Liability Insurance:
  - 1) \$1,000,000 each occurrence/  
\$2,000,000 aggregate;
  - 2) Property damage, with limits of not less than \$1,000,000 each occurrence/  
\$2,000,000 aggregate. Property damage insurance coverage shall include non-owned, hired, leased, or rented vehicles, as well as owned vehicles.
- (d) Umbrella liability \$5,000,000.



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- (e) Contractor's insurance policy shall name City as an additional insured on the General Liability, Automotive Liability and Excess Liability insurance policies. The insurance coverage shall be written with insurance companies acceptable to City. All insurance premiums shall be paid without cost to City. The Contractor shall furnish to City a Certificate of Insurance attesting to the respective insurance coverage for the full contract term. Contractor shall submit satisfactory proof of insurance simultaneously with the execution of the contract.
  
  - (f) All insurance policies shall provide that the City shall receive written notice of cancellation or reduction in coverage of any insurance policy thirty (30) days to the effective date of cancellation.

## SECTION III PART I

### **City of St. Charles Electric Services On Line Load Tap Changer (LTC) Inspection & Maintenance Invitation to Bid**

The City of St. Charles is seeking sealed bids from qualified contractors to inspect and repair as needed three load-tap-changers located at two substations.

Please bid the lowest price (itemized) and best delivery on items listed. The right is reserved to accept or reject bids on each item separately or as a whole, to reject any or all bids, to waive informalities or irregularities, to negotiate contract terms and options with the successful low bidder, and to contract for the bid to other than the lowest bidder in the best interest of the City of St. Charles.

Prior to submitting their bids, it is the contractor's responsibility to check the City website (See Information to Bidders at <http://www.stcharlesil.gov/bids-proposals> ) for any addenda associated with this Invitation to Bid.

#### **1.0 SUBMITTAL OF PROPOSAL**

Sealed bids for the **LTC Inspection & Service/Repair** as described in the accompanying Technical Specification shall be received **before 10:00a.m, Monday, December 21**, at the

City of St. Charles City Hall,  
Two East Main Street  
St. Charles, IL 60174  
Attention: Mike Shortall, Purchasing Division.

At that time and place the bids will be publicly opened and read. Any bid received subsequent to the time specified will be promptly returned to the Bidder unopened.

**All sealed envelopes must be clearly marked for which bid they pertain to.**

Interested Bidders shall "register" with Mike Shortall and provide name, phone number, and e-mail address.

Any questions shall be submitted to both Erika Drennan (Engineer) and Mike Shortall (Purchasing) via e-mail to the following e-mail addresses:

[edrennan@stcharlesil.gov](mailto:edrennan@stcharlesil.gov)  
[mshortall@stcharlesil.gov](mailto:mshortall@stcharlesil.gov)

**before Monday, December 7, 2015.**

## **SECTION III**

### **PART I**

Upon receipt of questions prior to December 7, the bidder shall receive a reply e-mail acknowledging the receipt of the question. Response to the question shall be as soon as practical. Should the question result in a clarification that requires addenda, such addenda will be issued to all registered bidders as soon as practical.

Questions submitted after December 7, 2015, shall not be acknowledged or answered. Bidder shall take all necessary steps to propose questions prior to December 7.

City reserves the right to extend the due date. Should an extension be necessary, communication of such shall be e-mailed to all registered bidders.

JM;cb

bid information\Invitation to Bid Sec III-Part I 11-1915MJim

## **SECTION III PART II**

### **City of St. Charles Electric Services On Line Load Tap Changer Inspection and Maintenance Technical Specification**

#### **ADDENDUM-1**

The following is an addition to the LTC maintenance specification:

#### **2.0 SCOPE OF WORK**

- 2.05 The Contractor shall provide a new Sudden Pressure Relay and Pressure Relief Device, gaskets and all services required to remove the existing Sudden Pressure Relay and Pressure Relief Device, install and test the new Sudden Pressure Relay and Pressure Relief Device.
- 2.06 The Contractor's trained certified technicians to furnish all equipment, supplies, labor, machinery, nitrogen gas services as necessary to provide safe, and efficient replacement of a Sudden Pressure Relay and Pressure Relief Device installed on ABB Electric 15/20/25 MVA Transformer Serial Number A0821X Manufactured in 1989, Instruction Book: A0820S while the transformer is out of service for the load tap changer inspection and maintenance; designated as transformer 5T1 on Attachment-A

JM/cb

bid information\Addendum-1 SPR-PRD 11-1915MJim

**SECTION III  
PART II**

**City of St. Charles Electric Services  
On Line Load Tap Changer Inspection and Maintenance  
Technical Specification**

**1.0 SUMMARY**

It is the purpose of this specification to obtain trained certified technicians to perform a visual inspection, cleaning and necessary parts replacement for On Line Load Tap Changers. Once inspection and maintenance are completed, the Contractor is to provide a written inspection report and health evaluation with digital photographs (jpeg format).

- 1.01 Attachment-A delineates the manufacturer, type, serial number, instruction book and location of each On Line Load Tap Changer.
- 1.02 The Contractor shall provide skilled personnel with the technical qualifications to perform service and repair all the On Line Load Tap Changers delineated in Attachment-A. All of the Substations are located in the City of St. Charles. All work conducted shall be performed by certified service technicians which are aware of their responsibility and know that their diligent work often decides the fate of high-value material assets.
- 1.03 The Contractor shall provide at least three (3) references, within the past three (3) years, of clients for whom services have been performed. The references shall include names, addresses, and telephone numbers of the clients for whom prior service was performed and include an explanation of the services provided.

**2.0 SCOPE OF WORK**

- 2.01 The Contractor shall mobilize all its own personnel and equipment to the substation site:
  - 2.01.01 Provide all labor, tools, equipment to complete inspection and maintenance. Contractor will provide a "not to exceed" cost for all replacement parts.
  - 2.01.02 Supply all oil, oil handling and storage. If the oil needs to get to the City before the contractor crews arrive, the oil is to be delivered to the substations. If required, city crews can help in the offloading with a line truck.
  - 2.01.03 Deliver and install all scaffolding to work safely on the LTC compartment.
- 2.02 The contractor shall inspect the on-load tapchangers, performing the following specific inspection, test, or maintenance tasks:
  - 2.02.01 Examine load tap changer, looking for signs of oil leaks or seepage. Verify correct oil level.
  - 2.02.02 Check desiccant condition, replacing desiccant and or oil as needed.
  - 2.02.03 Operate through all taps, both electrically and manually.
  - 2.02.04 Lubricate according to manufacturer's recommendations.
  - 2.02.05 Verify motor and drive train for correct operation and automatic motor cutoff at maximum lower and maximum raise.
  - 2.02.06 Verify correct automatic and manual control operation.

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LTC Inspection & Maintenance Spec

**SECTION III  
PART II**

- 2.02.07 Perform specific inspections and mechanical tests as recommended by the manufacturer.
- 2.02.08 Visually inspect wear or contact erosion indications on vacuum bottles if applicable.
- 2.02.09 Drain and properly dispose of oil from LTC tank; approximately 110 gallons.
- 2.02.10 Clean inside of LTC.
- 2.03 Perform internal inspection:
  - 2.03.01 Clean carbon residue and debris from compartment.
  - 2.03.02 Inspect contacts for wear and alignment.
  - 2.03.03 Inspect all electrical and mechanical connections for tightness using a calibrated torque wrench in accordance with the manufacturer's recommendations.
  - 2.03.04 Inspect the tap changer terminal boards for evidence of moisture, cracking, excessive wear, breakage, and or signs of electrical arcing or tracking.
  - 2.03.05 Operate tap changer electrically or manually as recommended by manufacturer through full range of taps.
  - 2.03.06 Adjust and repair as needed.
  - 2.03.07 Replace gaskets if necessary.
  - 2.03.08 Fill to correct level with new filtered oil.
- 2.04 Existing or potential problems in any of these areas shall be documented and reported to the City of St. Charles.

**3.0 SPECIAL REQUIREMENTS**

- 3.01 The City of St. Charles requires contractors to meet all State of Illinois requirements, such as human rights, prevailing wage rates, insurance, etc. (See Information to Bidders)
- 3.02 All work under this agreement shall comply with the Prevailing Wage Rate Act of the State of Illinois, Illinois Compiled Statutes, 1987, Chapter 820, par. 130/31, et. seq, and as amended by Public Acts 86-799 and 86-693 and our current city ordinance, with rates to be paid in effect at time work is performed.
- 3.03 Contractors shall submit certified payroll records to the city prior to being paid.
- 3.04 Contractor shall secure and maintain in effect at all times insurance of the following kinds and limits to cover all locations of the Contractor's operations in connection with work naming the City of St. Charles as an additional insured.
- 3.05 Contractor shall furnish Certificates of Insurance to the City before starting work.
- 3.06 The Contractor's equipment and personnel shall only occupy areas identified as safe by the City of St. Charles.
- 3.07 The Contractor will not be allowed to use any Subcontractors without prior approval from the City of St. Charles.
- 3.08 The Contractor shall provide digital color images (jpg format) for all major activities in their proper sequence.
- 3.09 Any additional repairs, parts or services that are required, but not included under agreement, will be brought to the attention of the City of St. Charles.

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LTC Inspection & Maintenance Spec

**SECTION III**  
**PART II**  
**4.0 ENVIRONMENTAL AND SAFETY REQUIREMENTS**

- 4.01 The Contractor shall work in a safe and professional manner and keep their worksite clean and safe at all times.
- 4.02 Workers are required to wear appropriate PPE as described and recommended through The National Fire Protection Association (NFPA) 70E Standard for Electrical Safety Requirements for Employee Workplaces.
- 4.03 The Contractor shall provide all required safety equipment for work to include but not limited to hard hat, category-2 Arc-rated clothing, upper and lower body outer layers, steel toed shoes and safety glasses.

**5.0 WORK SCHEDULE**

- 5.01 Work hours are scheduled from 7:00 a.m. to 5:00 p.m. five days a week from Monday through Friday. Work on Saturday is possible if it is required to finish all work and allows the maintenance crew to leave without having to spend the weekend.
- 5.02 All work is expected to be performed between February 1 and April 1, 2016.

**6.0 CITY RESPONSIBILITIES**

- 6.01 A City representative will occupy the sites throughout the duration of the project.
- 6.02 The City shall be responsible for switching, lock out, and grounding of any equipment necessary to establish a safe work area. City crews will make every effort to stay ahead of the LTC maintenance crew and have transformers switched out and grounded.
- 6.03 The City shall provide suitable, free and clear access to the equipment.
- 6.04 The City shall disconnect and reconnect all external protection, control and relay wiring as required.
- 6.05 The City shall be responsible for the disposal of solid waste.
- 6.06 The City shall provide drum and dispose of all waste, flush and scrap oil generated in execution of work.
- 6.07 The City shall provide communication and sanitation facilities.

**7.0 DEVIATIONS**

Any deviation from this specification must be clearly pointed out; otherwise, it will be considered that items offered are in strict compliance with this specification, and the contractor will be held responsible therefore. Deviations must be explained in detail on an attached sheet(s). The contractor shall not construe this paragraph as inviting deviation or implying that any deviation will be acceptable.

Attachment-A

**ON LINE LOAD TAP CHANGER INSPECTION AND MAINTENANCE  
TECHNICAL SPECIFICATION**

Transformer 5T1	ABB Electric 15/20/25 MVA	Serial: A0821X
Manufactured: 1989	Instruction Book: A0820S	
Load Tap Changer:	ABB Electric type UZDRT	
Breather:	High Voltage Supply ARDB2-0000	
Oil:	Approximately 100 gallons	

The transformer is located at the Dukane Substation #5, 2561Dukane Drive, St. Charles IL. 60174

Transformer 5T3	Magnetek 15/20/25 MVA	Serial: A1401X
Manufactured: 1990	Instruction Book: A140S	
Load Tap Changer:	UZDRT	
Breather:	High Voltage Supply ARDB2-0000	
Oil:	Approximately 100 gallons	

The transformer is located at the Dukane Substation #5, 2561Dukane Drive, St. Charles IL. 60174

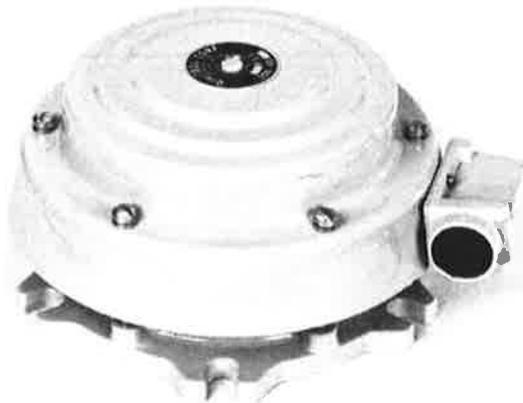
Transformer 7T1	Waukesha 15/20/25 MVA	Serial: A2561X
Manufactured: 1996	Instruction Book: A2560S	
Load Tap Changer:	UZDRT	
Breather:	High Voltage Supply ARDB2-0000	
Oil:	Approximately 100 gallons	

The transformer is located at the Dunham Road Substation #7, 1000 Dunham Rd., St. Charles IL. 60174

City of St. Charles  
Municipal Electric Utility

LOCATION NAME:	Dukane Substation No. 5		Dunham Road Sub-7	
ADDRESS:	2561 Dukane Dr		1000 Dunham Road	
STATION TRANSFORMER:	5T1		7T1	
MANUFACTURER	ABB ELECTRIC		WAUKESHA	
YEAR OF MANUFACTURE	1989	1990	1996	
SERIAL NO.	A0821X	A1401X	A2561X	
COOLING TYPE	Forced Air	Forced Air	Forced Air	
TRANSFORMER TYPE	Sealed	Sealed	Sealed	
PHASE	Three	Three	Three	
PRIMARY VOLTAGE (kV)	34.5	34.4	34.5	
PRIMARY WINDING	Delta	Delta	Delta	
SECONDARY VOLTAGE (kV)	12.47/7.2	12.47/7.2	12.47/7.2	
SECONDARY WINDING	WYE	WYE	WYE	
PRIMARY BILL (kV)	200	200	200	
SECONDARY BILL (kV)	110	110	110	
SECONDARY NEUTRAL BILL (kV)	110	110	110	
IMPEDENCE (%)	6.59	6.63	6.67	
MVA RATING @ 55°C	15/20/25	15/20/25	15/20/25	
MVA RATING @ 65°C	16.8/22.4/28	16.8/22.4/28	16.8/22.4/28	
CLASS	OA/FA/FA	OA/FA/FA	OA/FA/FA	
TEMPERATURE RISE (°C/°C)	55/65	55/65	55/65	
LTC LOAD TAPS - WDG & RANGE	HV + 5% -5%	HV + 5% -5%	HV + 5% -5%	
LOAD TAPCHANGER SWITCH	UZDRT	UZDRT	UZDRT	
CORE AND COIL (lbs)	45400	45400	469	
TANK & FITTINGS (lbs)	38400	37700	1296	
RADIATORS (lbs)	15200	15200		
TYPE OF COOLANT	Mineral Oil	Oil	Oil	
OIL MAIN TANK (gals)	3820	3760	3755	
OIL LTC (gals)	100	100	100	
OIL RADIATORS (gals)	640	700	705	
TOTAL OIL (gals)	4560	4560	4560	
TOTAL WEIGHT (lbs)	118000	117400	117900	

**PRESSURE RELIEF DEVICE**

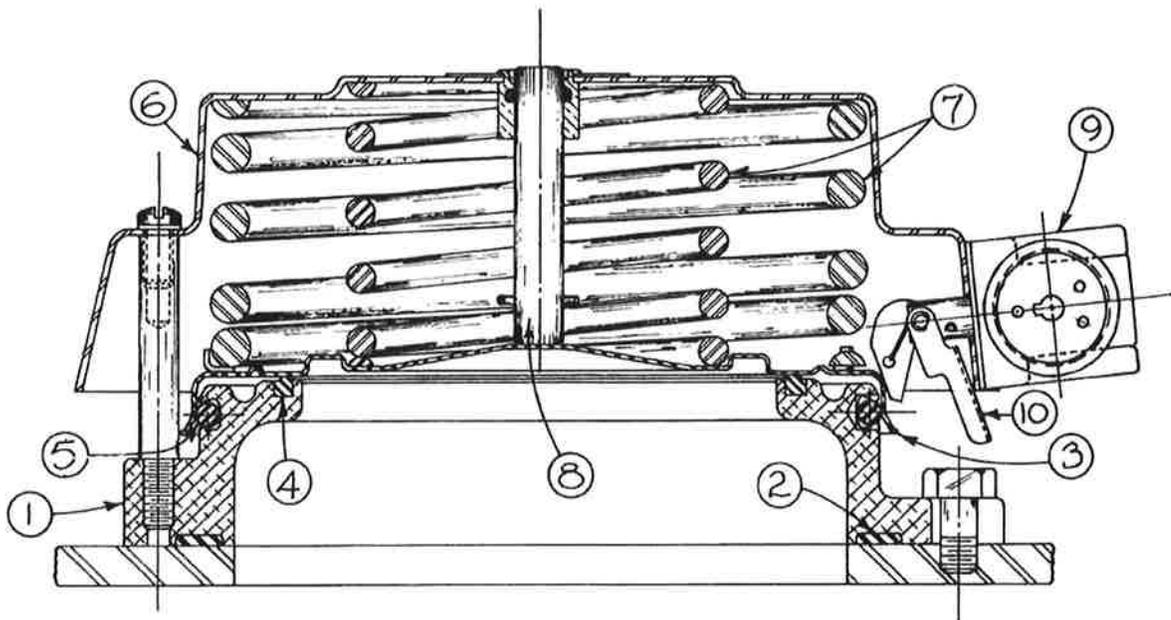


Pressure relief devices play a vital role in the protection of power transformer systems. Power transformers are filled with an insulating and cooling liquid. Should a fault or short circuit occur, the arc instantaneously

vaporizes the liquid causing extremely rapid buildup of gaseous pressure. If this pressure is not relieved adequately within several thousandths of a second, the transformer tank will rupture spraying flaming oil over a wide area. The damage and fire hazard possibilities of this consequence are obvious, and it is imperative that measures be taken to prevent them.

Some installations employ conventional slow-acting pressure relief devices as the means to prevent the disastrous effects of a fault or short circuit; but it is most important to note that these conventional devices *do not* respond quickly enough to relieve an instantaneous pressure buildup.

The design of the QualiTROL pressure relief device, however, is such that the sensing and relief of dangerous pressure increases are accomplished immediately. Full valve opening occurs within 2 milli-seconds.



**DESIGN AND OPERATION:**

The pressure relief device is essentially a spring-loaded valve having a unique means of providing instantaneous amplification of actuation force. In the above cutaway drawing, the unit is shown mounted on the transformer by lugs on flange (1) and sealed by mounting gasket (2). Valve disk (3) is spring-loaded and

sealed against gasket rings (4) and (5) by springs (7). Valve operation is effected when the pressure acting against the area defined by gasket ring (4) exceeds the opening pressure established by springs (7). As disk (3) moves upwards slightly from gasket ring (4), the transformer pressure then quickly becomes exposed to the disk area of the diam-

eter of gasket ring (5), resulting in a greatly increased force, and causing immediate full opening of the valve corresponding to the closed height of the springs (7). The transformer pressure is rapidly reduced to normal values and springs (7) return valve disk (3) to the closed position. A minute bleed port to outside from the volume entrapped between gasket ring (4) and gasket ring (5) prevents inadvertent valve operation in the event that foreign particles on gasket ring (4) present an imperfect ring-to-disk seal.

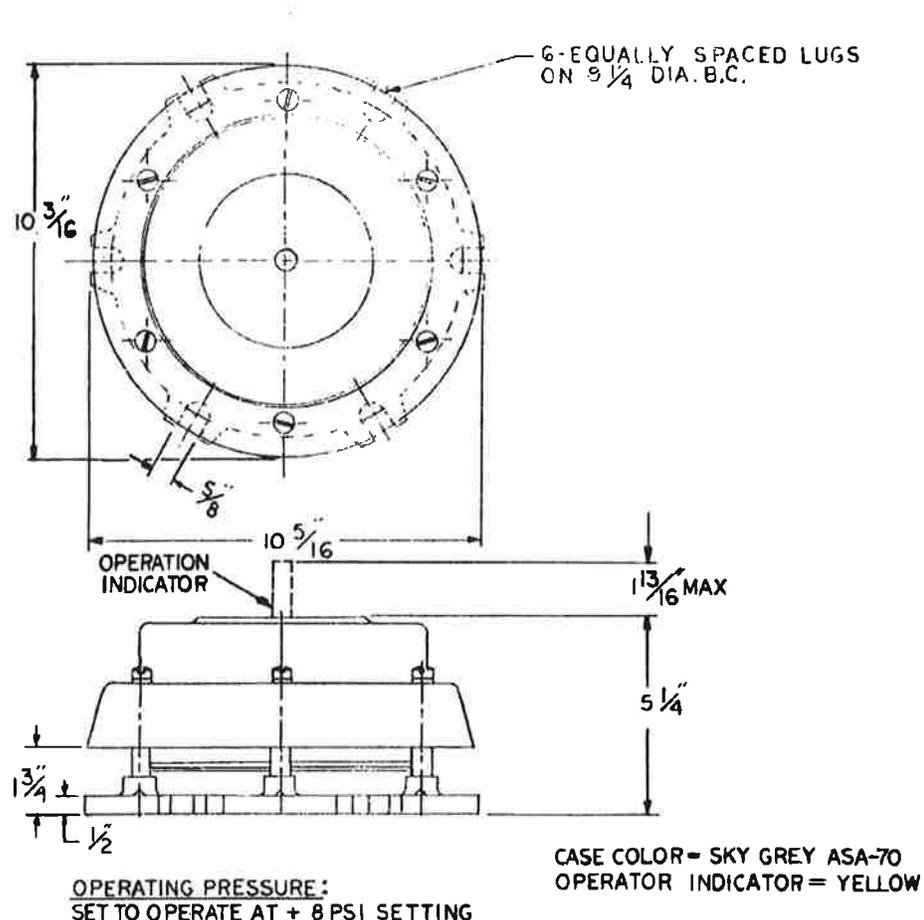
A bright color-coded mechanical indicator pin (8) in cover (6), although not fastened to valve disk (3) moves with it during operation and is held in the valve-open position by an O-ring in the pin bushing. This pin is clearly visible from a great distance, indicating that the unit has functioned. Pin (8) may be reset by manually pushing it downward until it rests on valve disk (3). A long-armed semaphore, not shown on the cutaway drawing, can also be supplied for visual indication from even greater distances that the unit has functioned.

The relief device can be provided with a sealed, weather-proof alarm switch assembly (9) mounted on the cover. The switch assembly includes a single-pole, double-throw switch having a 3 conductor cable for connection to a remote alarm or signal device. Actuated by movement of valve disk (3), the switch is manually reset by arm (10).

#### OPERATION INDICATORS:

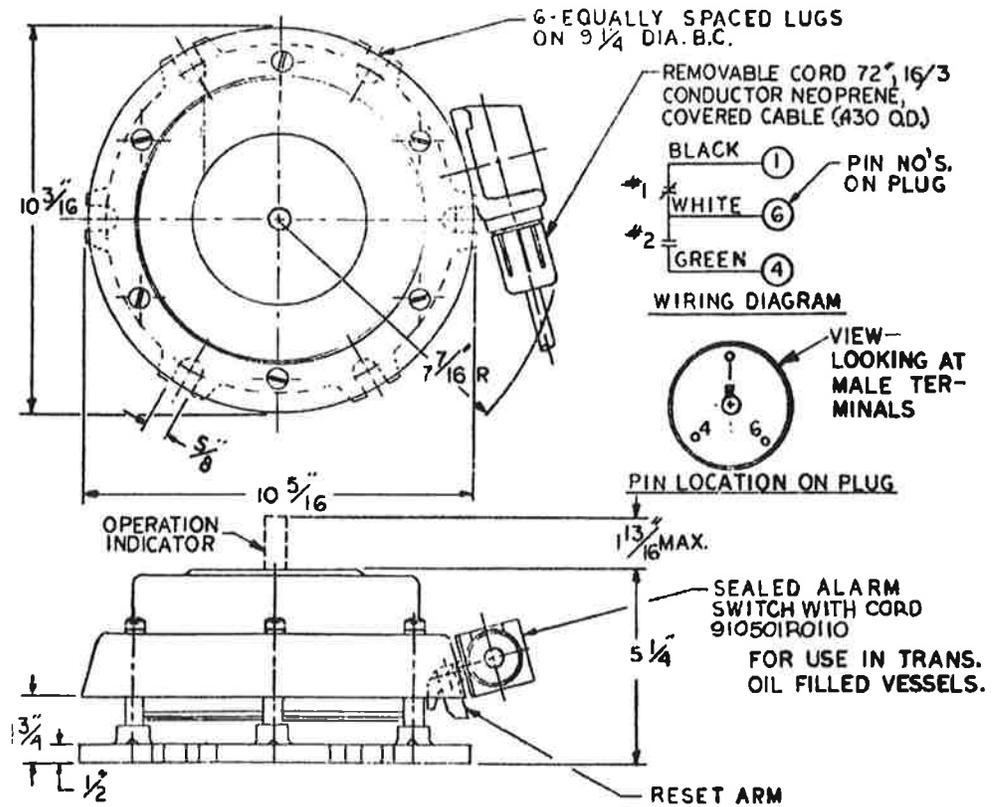
As previously described, three types of operation indicators can be supplied:

1. As a standard, a color-coded plastic pin located in the center of the cover.
2. As an option, a manually resettable switch for remote alarm or indication.
3. As an additional option, a long-armed manually resettable semaphore.



FOR USE IN TRANS. OIL  
FILLED VESSELS.

PRESSURE RELIEF DEVICE  
Part No. 910501 R 02



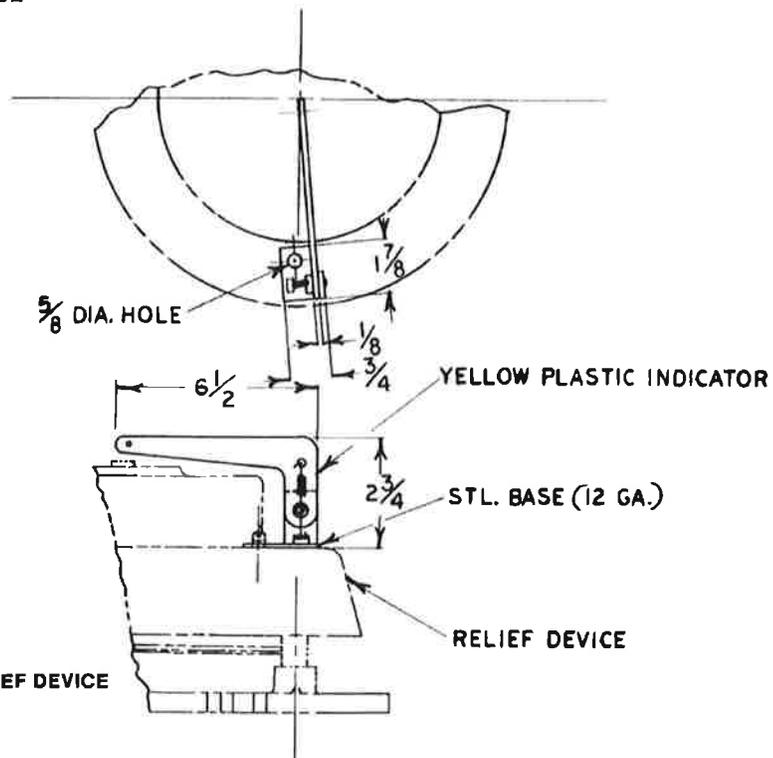
TYPE: SINGLE-POLE, DOUBLE-THROW SWITCH CASE COLOR=SKY GREY ASA-70  
 OPERATION INDICATOR=YELLOW

OPERATION: CONTACT #1 NORMALLY CLOSED,  
 CONTACT #2 NORMALLY OPEN. CONTACT  
 #2 CLOSSES AND CONTACT #1 OPENS  
 WHEN VALVE OPERATES.

OPERATING PRESSURE:  
 SET TO OPERATE AT +8 PSI SETTING

RATINGS:  
 15 AMPS. AT 125V 250V 480V A.C.  
 .50 AMP. AT 125V D.C. (NON-INDUCTIVE)  
 .25 AMP. AT 250V D.C. (NON-INDUCTIVE)

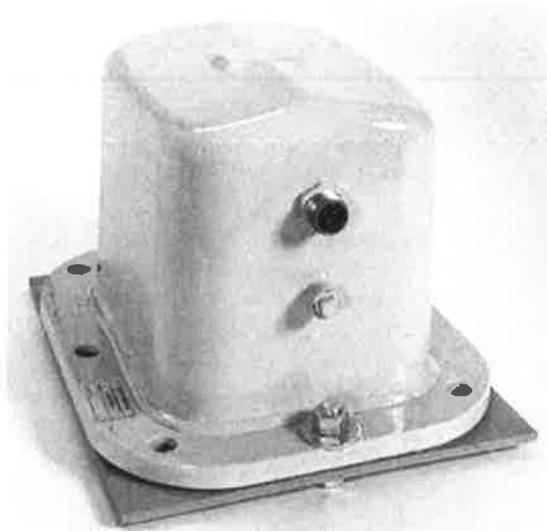
**PRESSURE RELIEF DEVICE  
 (WITH ALARM)**  
 Part No. 910501 R 01



**SEMAPHORE — FOR RELIEF DEVICE**  
 Part No. 910501 R 005

**SUDDEN PRESSURE RELAYS**

10/87



**Fig. 1 Sudden pressure relay.**

**GENERAL DESCRIPTION**

The Westinghouse Sudden Pressure Relay is a device designed to respond to the sudden increase in gas pressure in a power transformer which would be caused by an internal arc. The Relay consists of three main parts: a pressure sensing bellows, a Microswitch, and a pressure equalizing orifice (Figure 1), all enclosed in a sealed case and mounted on the gas space at the top of the transformer.

When an arcing internal fault in the transformer produces an abnormal rise in gas pressure, the bellows will expand, operating the Microswitch and signaling the occurrence of the fault. The equalizing orifice is a non-corrosive plug with a very small hole, which will equalize the pressures in Relay and gas space during the slow pressure variations associated with

transformer load changes. It will throttle an abnormal increase in transformer pressure, however, and cause a signal. Figure 3 shows the operating characteristic of the Relay.

**INSTALLATION**

The Sudden Pressure Relay is mounted above the maximum oil level in the gas space when applied on transformers. The Relay can be satisfactorily mounted on the transformer cover, particularly when applied to transformers in the field.

When vacuum filling a transformer on which a Sudden Pressure Relay is mounted, *care must be taken that the Relay is not filled with oil.* Also pull vacuum and break vacuum at 1/4 psi/second maximum to avoid any possibility of straining the bellows. If the transformer is shipped with a dummy plate mounted in place of the Sudden Pressure Relay, the transformer should be filled with oil before the Relay is mounted. If the Relay should accidentally be filled with oil, it should be replaced.

**OPERATION**

The Sudden Pressure Relay will accomplish the following: (See Figure 3).

1. It will operate on a sudden increase of gas pressure regardless of the operating pressure on the transformer.
2. A pressure rise of 5.5 psi per second will operate the Relay in three to four cycles on a 60 Hertz circuit.
3. At high rates of rise: 30 to 40 psi per second, it will operate in a half cycle.
4. It will not operate on changes in pressure due to normal transformer operation.

**TABLE NO. 1.  
BZ-2RD-T Microswitch Rating**

Voltage	RATED CAPACITY OF CONTACTS (AMPS)				
	Make & Carry (Amps)	Break (Max. Amps)		Incandescent Lamp Load, Max. Heated Filament Amps.	
		Resistive	Inductive	N.C. Contact	N.C. Contact
115 V.A.C.	15	15	15	1.5	3.0
230 V.A.C.	15	15	15	1.25	2.5
24 V.D.C.	15	2	1	1.5	2.0
48 V.D.C.	15	.8	.05	0.8	0.8
125 V.D.C.	15	.3	.03	0.3	0.3
250 V.D.C.	15	.2	.02	0.2	0.2

5. It will detect abnormal disturbances which are insufficient to operate the conventional pressure relief device.
6. Mounting of the Relay is rigid and well braced to prevent false operation due to the vibrations which accompany through short circuits.

### MAINTENANCE

It is desirable to check the operation of the Relay when it is installed and every six months or a year afterwards. There is a definite relationship between the transformer gas pressure and the time required to equalize the pressures between the transformer and the Relay. This relationship is shown graphically in Figure 4 and is the basis for checking the operation of the relay. The following test may be made on the Relay while the transformer is in service, providing the transformer is operating at a positive tank pressure in excess of  $\frac{3}{4}$  psig.

### FIELD TEST PROCEDURE

1. Disconnect the Relay supply voltage.
2. Record the transformer operating pressure. *(Note: The pressure must be greater than  $\frac{3}{4}$  psi for the following tests.)*
3. Connect a circuit tester.
4. Remove the test plug from the Sudden Pressure Relay case. The Microswitch will operate and the circuit tester will indicate an open contact.
5. Close the test plug and record the time in seconds required for these same contacts to close.
6. Using the recovery time recorded in (5) and the pressure recorded in (2) as coordinates on Figure 4, Time and Pressure Curve, check to see that the point is within the allowed operating area. Wide deviation of this field test point from the allowed area of the curve should be referred to the nearest Westinghouse office.

It will be necessary to remove the Sudden Pressure Relay only if a fault is found when testing the Microswitch and bellows (steps 1 to 6). If this is required the gas space in the transformer tank must be brought to atmospheric pressure. The Sudden Pressure Relay can then be removed and replaced by a new Relay.

### FACTORY TESTS

The factory tests made on the Sudden Pressure Relay are more conclusive than that necessary for field testing to insure that the Sudden Pressure Relay is in operating condition and properly calibrated.

The following tests are made on all Sudden Pressure Relays at the factory:

1. A 1500 Volt, 60 Hertz insulation test to ground is applied to the electrical circuit of the Sudden Pressure Relay and the panel for one minute.
2. An operation test is made to determine the "make" and "break" pressure of the Microswitch:
  - a. The maximum "make" pressure, at which point the normally-open contacts of the Microswitch close, is 0.44 psi or 12 inches of water.
  - b. The minimum "break" pressure, at which point the normally-open contacts of the Microswitch reopens, is 0.29 psi or 8 inches of water.
3. An orifice test is made in the same manner as outlined under Field Test Procedure.

The above tests check the operating characteristics of the Sudden Pressure Relay without actually making a rate-of-rise pressure test.

4. A 20 pound pressure test is made to insure that the Relay case is pressure tight. During this test it is necessary to apply pressure to both the tank side and the Relay case so as not to damage the bellows.
5. The bellows is tested at 15 pounds pressure while positioned in a fixture to limit its travel to a maximum of  $\frac{1}{16}$ " from free length. When the pressure is released the bellows must return to within .005 inch of its original free length. The maximum pressure applied to the bellows in the completed Sudden Pressure Relay should be limited to 8 psi.

### PROCEDURE FOLLOWING A RELAY OPERATION

After a Sudden Pressure Relay has tripped the circuit breaker and disconnected the transformer, it becomes necessary to decide whether to reclose the breaker and put the transformer back in service. If the transformer is severely damaged, it would probably trip again immediately but not before suffering additional severe damage. If the transformer is not badly damaged, it might carry load for some time. The transformer might not even be damaged at all. The decision must be made by the user, but the following steps are suggested to help determine the extent of damage:

1. Check the Combustible Limit Relay (CLR). Determine whether an increase in combustible gas has occurred. This would indicate internal arcing and damage. Refer to the CLR Instruction Leaflet.

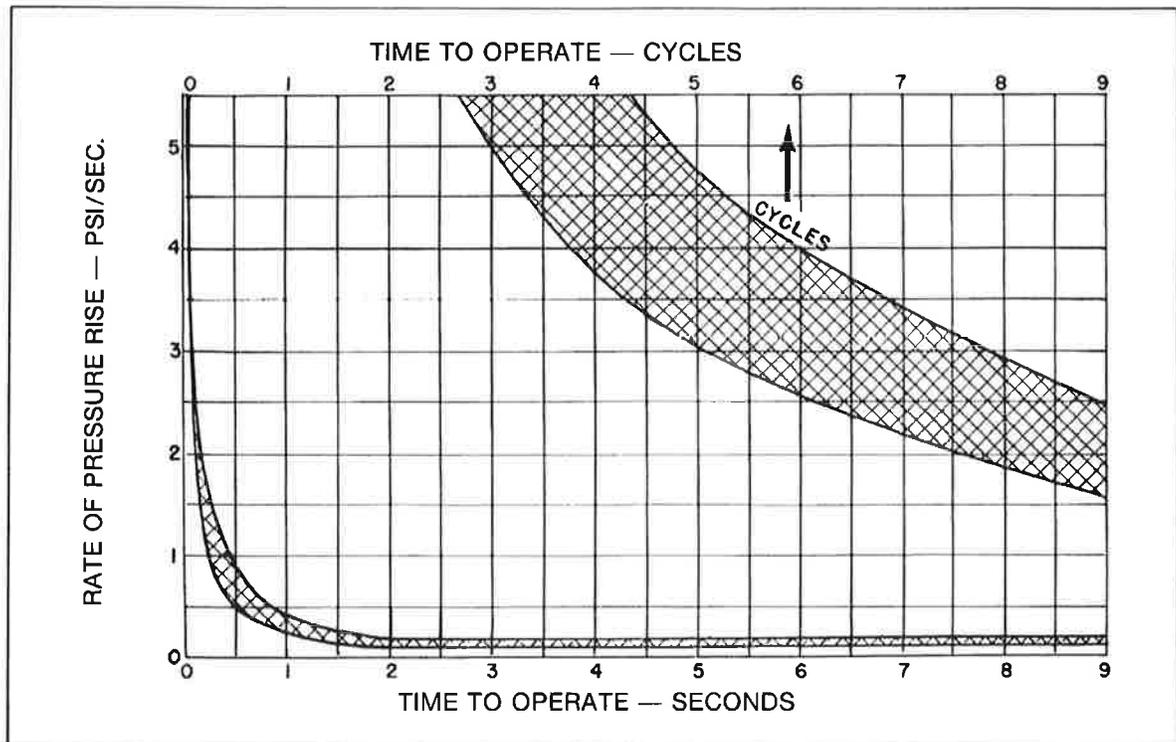


Fig. 3 Operating characteristics of sudden pressure relay.

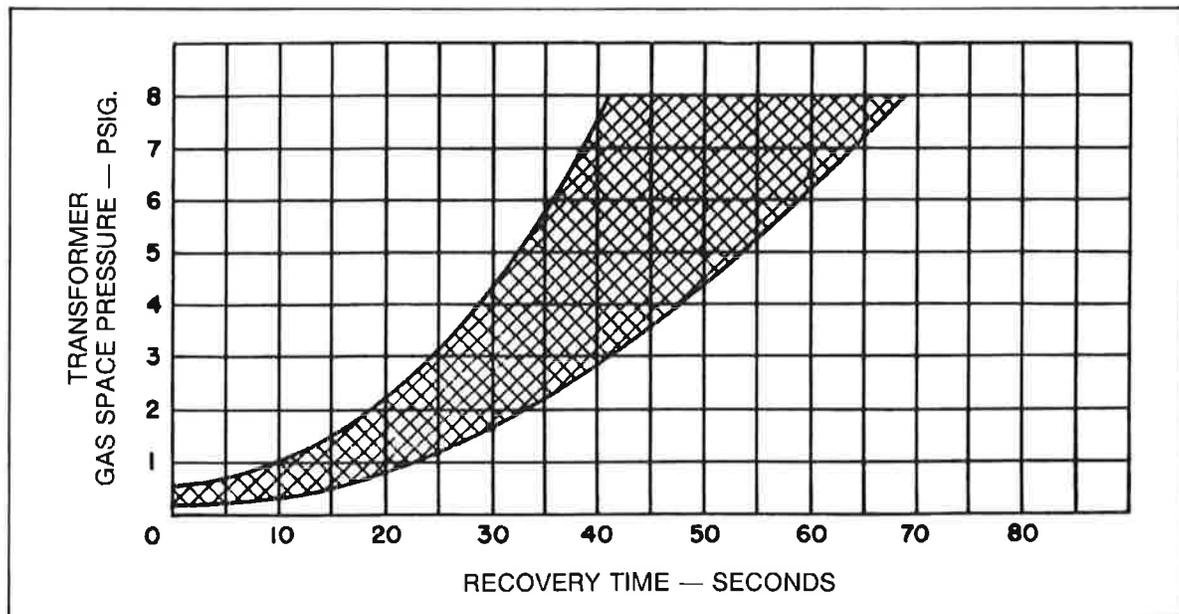


Fig. 4 Time and pressure curves.

If the transformer does not have a CLR, the alternative is to use a portable Combustible Gas Detector to check for combustible gas products of decomposition in the gas space. Refer to the operating instructions for the Gas Detector.

2. Make the Field Tests of the Sudden Pressure Relay and its Panel as described on pages

3 and 4. This will determine whether the Relay is in proper operating condition.

3. Make insulation power factor and insulation resistance tests and check the Transformer Turns Ratio.

4. Remove the manhole cover for observation. Sometimes the odor of burning is obvious.

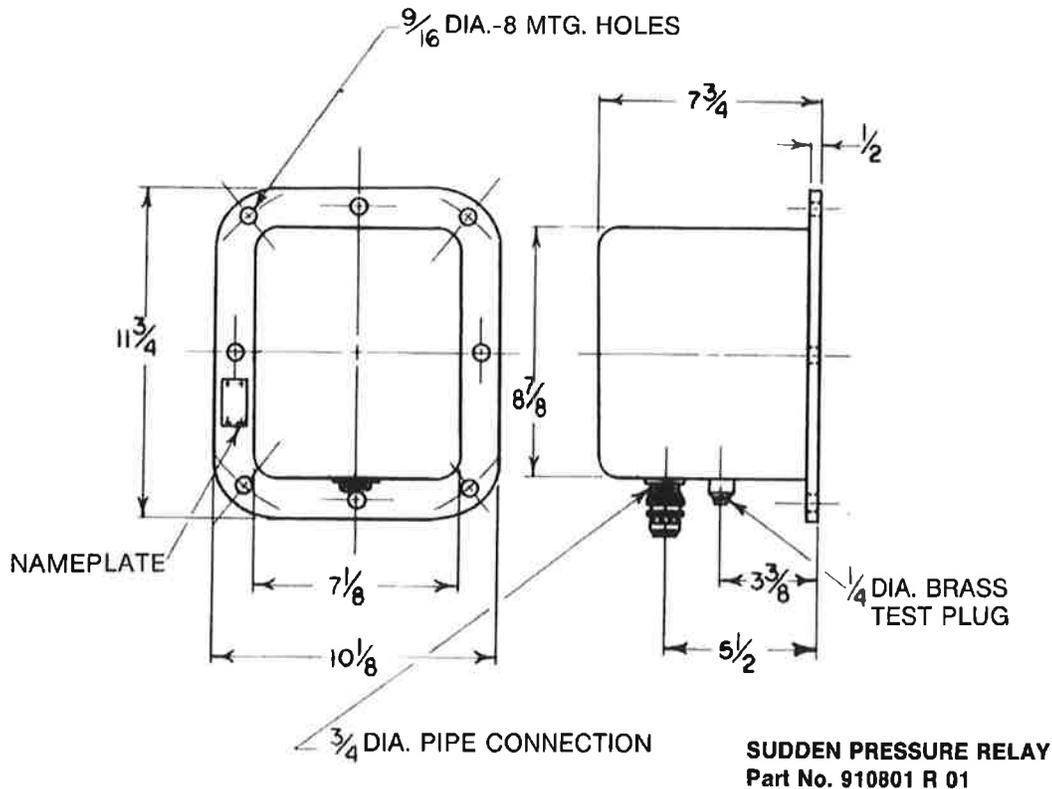
5. Make any other tests which may be suggested by the results of the above checks.

After the condition of the transformer and Relay have been checked, and if no damage has been found, it is necessary to decide whether the breaker should be reclosed to put the transformer back into service. The risk of possible further internal damage must be balanced against the possibility that there is no serious internal damage and the urgency for restoring service.

One possibility is that the internal fault might have been self-healing. Sparkovers can occur between turns or even between taps or terminal connections which normally operate at low voltage between points; a sparkover may be cleared because the normal operating voltage is simply not sufficient to restrike the arc. While such a sparkover should not occur with modern designs and lightning arresters, they do occur.

Another possibility is that the Relay operation was caused by extraneous electrical or mechanical disturbances. These might be caused by an electrical storm, or might even be side effects of constantly changing transformer, station, and system practices. Whenever a cause of a false operation has been identified, changes have been made in the design or application of the Relay to prevent a recurrence from that cause.

If the breaker is reclosed and it remains closed, there may still be some suspicion that an arc did occur inside the transformer. In this case, gas and oil samples may be sent to ASEA ELECTRIC for Gas Composition Analysis. This Analysis will indicate conditions inside the transformer. Arrangements for the Analysis should be made through ASEA ELECTRIC.



## ADMINISTRATIVE INFORMATION

### City of St. Charles Contacts:

All questions should be submitted via email with the subject heading:  
*LTC Inspection and Service/Repair.*

Inquiries will not be accepted by telephone. Questions or inquiries should be sent to [edrennan@stcharlesil.gov](mailto:edrennan@stcharlesil.gov)

All questions submitted will be answered on the Purchasing Division website:  
<http://www.stcharlesil.gov/bids-proposals> on the date indicated below.

Questions regarding opening documents or accessing items on the website should be addressed to:

Mike Shortall  
Purchasing Division.  
E-mail: [mshortall@stcharlesil.gov](mailto:mshortall@stcharlesil.gov).

### Due Date:

Submissions must be received **before 10:00a.m, Monday, December 21**, at the City of St. Charles City Hall, Two East Main Street, St. Charles, IL 60174.

In order to be considered for the award, all submissions must be received at the appropriate location by the required time. Any package not received on time at the noted location will be rejected.

Refer to the Submissions Requirements section of this document for further details.

### Schedule of RFP Events:

Request for Bids Issued	November 26, 2015
Questions Due	December 7, 2015
Submissions Due	December 21, 2015

JM:cb